

**ABSTRACT OF THE DISCLOSURE**

A method of using high yielding spectra scatterometry measurements to control semiconductor manufacturing processes and systems for accomplishing same is disclosed. In one embodiment, the method comprises providing a library comprised of at least one target optical characteristic trace of a grating structure comprised of a plurality of gate stacks, the target trace corresponding to a semiconductor device having at least one desired electrical performance characteristic, providing a substrate having at least one grating structure formed thereabove, the formed grating structure comprised of a plurality of gate stacks, illuminating at least one grating structure formed above said substrate, measuring light reflected off of the grating structure formed above the substrate to generate an optical characteristic trace for the formed grating structure, and comparing the generated optical characteristic trace to the target trace.